REMARKS

Claims 1-3, 5-17, 19, 21 and 22 are pending in the application. Claims 1-3, 5-17, 19, 21 and 22 stand rejected. Claims 23 – 31 are newly added. It is believed that the remarks laid out herein below address each of the Examiner's rejections of the Claims. When used below, numbers in titles indicate remarks corresponding to the numbered paragraphs of the Office Action mailed 7 July 2004.

1. Response to Remarks

Applicant thanks Examiner for his summary of remarks and responds briefly. As Examiner's remarks appear echoed in the body of his response, Applicant responses are generally in line with Examiners subsections below.

Applicant respectfully maintains that a tip for applying a voltage is different from an energy-emitting tip. Manalis teaches an AFM tip which can oxidize a metal substrate. The Examiner states that "Manalis teaches an energy-emitting tip. In other words to emit energy such as light, thermal or electron etc., *a **voltage is required as a source of energy*** generating means;" (emphasis added).

Such a sweeping and erroneous generalization may partially suggest why Examiner is failing to recognize the clear and distinct advantages and differences set forth by Applicant. Applicant respectfully submits that a voltage is ***NOT*** required as a source of energy generating means. For instance, a fire and chemical reactions can generate light and thermal energy without requiring voltage.

Examiner's contention that FIG. 2 of Manalis teaches a tip 115 in contact with a substrate S and a "thin layer of fluid absorbed on there..." is apparent fabrication. No illustration of a fluid layer is in evidence in FIG. 2. No illustration of a fluid layer is suggested or implied by FIG. 2. No item number or visual indication whatsoever is provided as an illustrative example of a fluid layer. Further, as is discussed with greater clarity below – Manalis teaches a fluid adsorbed ***NOT*** "absorbed" as stated by examiner. If Examiner persists in maintaining this erroneous view that Manalis FIG. 2, or any other Manalis figure teaches a fluid layer, Examiner is requested to supply a figure number that is clearly referenced within Manalis as being a fluid layer.

2 - 3. Claim Rejections – 35 U.S.C. § 102(e)

Claims 9, 10, 12 and 14 are rejected under 35 U.S.C. § 102(e) as being allegedly anticipated by U.S. Patent No. 6,519,221 ("Manalis"). Respectfully, Applicant disagrees and traverses the rejection.

To anticipate a Claim, Manalis must teach every element of the Claim and "the identical invention must be shown in as complete detail as contained in the ... Claim." MPEP 2131 citing *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987) and *Richardson v. Suzuki Motor* Co., 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989). Applicant respectfully submits that many differences exist in the Claimed elements between Manalis and Applicant's Claimed invention such that Manalis cannot be said to anticipate Applicant's invention. More specifically, Manalis does not teach every element of Applicant's Claims 9, 10, 12 and 14, as demonstrated herein below.

Examiner has apparently reviewed Manalis with only sufficient perception to make sweeping generalizations. In no figure provided in Manalis can any component be identified as a specific fluid layer. It is simply impossible to construe from either FIG. 1 or FIG. 2 that:

a) any fluid layer is present;

b) the cantilever 115 is immersed in the fluid layer; or

c) the purpose or function provided by the fluid.

Manalis suggests that a layer of water may be adsorbed to the surface. "Adsorb" and "absorb" although close are different in meaning, and are not to be interchanged as Examiner has done. To absorb is to suck up or take up. Adsorption is the adhesion in an extremely thin layer of molecules (as of gases, solutes, or liquids) to the surfaces of solid bodies or liquids with which they are in contact. (www.m-w.com). The true purpose of the adsorbed fluid under Manalis – defined only as water (Col. 3 line 11) – is left to mere speculation. In the summary, Manalis states that "the extreme hardness and cylindrical shape of the SWNT element avoids significant tip wear" (Col. 2 line 1-2) but there is nothing to suggest or imply what the function and purpose of the adsorbed layer might be other than perhaps to assist in reducing wear.

Whereas in Manalis the purpose of any such fluid adsorbed upon the surface is left entirely to unfounded speculation, in Applicant's invention the fluid medium is clearly taught. Specifically, Applicant discloses particles of metallic material within the fluid medium, the dispersed particles having sufficient tolerance to align between the tip and the storage medium along the directed high-power-density beam when such a beam is emitted from the tip.

These aligned metallic particles form a ***temporary wire-like column to facilitate the transfer of the applied energy from the tip to the data storage medium***, and in so doing

facilitate the change in memory state in a manner complementary to the material properties of the data storage material. When the tip ceases to emit the directed high-power-density beam the particles of magnetic material will re-disperse throughout the fluid medium. In no rational way can Manalis be said to disclose Applicant's facilitated transfer of energy.

Manalis does not even teach any molecules or particles that could possibly function like Applicant's Facilitated transfer of energy. At no time and in no place does Manalis state that any provided fluid layer is comprised of one-dimensional molecules. At no time and in no place does Manalis state that the molecules comprise conductive molecules. Should Examiner persist in such views, Applicant respectfully requests Examiner to specifically state where such statements are to be found within Manalis.

It appears that Examiner is attempting to assert that the thin fluid layer of Manalis teaches the conductive particles within the fluid medium of Applicant by making the absurd statement that all materials are equivalent and interchangeable simply because they comprise molecules. While an electrical conductor and a dielectric both contain molecules, their vastly different arrangements of molecules provide each structure with unique properties – the electrical conductor to conduct and the dielectric to insulate. Theses properties are not equivalent simply because each material contains molecules. Likewise, the molecules in the thin fluid layer of Manalis are not equivalent to the particles in the fluid medium of Applicant.

Further, Manalis teaches only that "bits are written by application of a voltage, via tip 115, to an oxidizable metal surface." (col. 3, lines 8-10). The application of such a voltage is clearly unrestrained, undirected and omni-directional – rather it must be inferred as a radiant voltage source. In sharp contrast, Applicant utilizes a directed beam of energy. Unlike the voltage potential and its oxidizing influence as taught by Manalis, the directed beam of energy emitted by Applicant's tip is specifically focused and directed upon a specific point of the data storage medium.

Applicant therefore respectfully submits new Claims 23 through 31 which specifically state these aspects of distinction.

After careful review of Examiner's statements in support of rejection, it appears that Examiner has not fully appreciated or reviewed Applicant's responses. Respectfully, and for Examiner's convenience, Applicant incorporates by reference each and every statement from Applicant's prior responses, and provides similar statements with further support for this 102 response below.

Claim 9: The Examiner again states that Manalis teaches "an energy-emitting tip 115". As noted above, Manalis teaches only that "bits are written by application of a voltage, via tip 115, to an oxidizable metal surface." (col. 3, lines 8-10). Voltage is a measure of the energy required to move a charge from one point to another. Voltage itself is not energy, but a measure of ***potential energy*** between two points in an electrical field. Thus, the "application of a voltage" in Manalis does not teach "energy-emitting". Indeed, it is not exactly clear what Manalis teaches by the application of a measure of potential energy.

Even if the Examiner were to erroneously interpret voltage to mean energy, Manalis does not teach that energy is guided or directed. Applicant's original disclosure clearly describes that the tip emits an ***energy beam***, that the invention ***focuses*** and ***channels*** the energy beam, and that as a result "there is ***less need for the high voltages and high fields***...." (Specification, p. 9, lines 13, 17-19, 30-33) As such, Applicant's invention teaches a directed energy beam that eliminates the need for a radiant voltage, which is a measure of potential energy between two points in an undirected, broad electrical field. The emission of energy (such as thermal or light) is not dependent upon an electrical field. Thus, the guided energy of Applicant's invention is antithetical to Manalis's teaching of application of voltage.

Examiner also states that Manalis teaches molecules that are at least partially immersed in a fluid medium because "the fluid layer [of Manalis] is particles/molecules in a liquid form." Applicant respectfully disagrees that Manalis teaches any such molecules. However, as Examiner's statement recognizes, ***the only molecules which Manalis could possibly teach are the molecules of the fluid itself***.

Manalis **cannot and does not** teach molecules that are at least partially immersed in that fluid, because it is clear that ***the immersed molecules Applicant teaches are molecules other than those which comprise the fluid itself***. "Immerse" means "to plunge into something that surrounds or covers; *especially* : to plunge or dip into a fluid." (www.m-w.com). Thus, it is clear that Applicant teaches molecules that are plunged or dipped into a fluid, i.e. molecules, other than the fluid molecules, which are immersed into the fluid molecules.

Applicant's teaching of immersing molecules into a fluid would be meaningless if the immersed molecules were identical to the molecules comprising the fluid, i.e., there would be no point to Claiming immersion of molecules into a fluid of identical molecules because nothing is achieved by such immersion other than an increase in the number of identical molecules.

Examiner cites FIG. 1 of Manalis as indicating molecules between the energy-emitting tip and the storage medium where the molecules are at least partially immersed in a fluid medium. FIG. 1 does not illustrate any molecules or any fluid medium (or an energy-emitting tip). No item number or visual indication whatsoever is provided as an illustrative example of

any molecules or any fluid layer. If Examiner persists in maintaining this erroneous view that Manalis FIG. 1, or any other Manalis figure teaches molecules or a fluid layer, Applicant requests Examiner to supply a figure number by which Manalis clearly refers to molecules or a fluid layer.

Examiner also cites column 2, lines 42 and 43 of Manalis as indicating molecules between the energy-emitting tip and the storage medium where the molecules are at least partially immersed in a fluid medium. The entire sentence containing those lines states: "Instead, the tip contacts substrate S (actually, a thin layer of fluid adsorbed thereon) as it is scanned over the surface." Notably, Manalis teaches a fluid layer ***adsorbed*** to the substrate, ***not absorbed*** to the substrate as Examiner states. As noted above, adsorption is the adhesion in an extremely thin layer of molecules (as of gases, solutes, or liquids) to the surfaces of solid bodies or liquids with which they are in contact. (www.m-w.com).

Thus, the molecules of the fluid layer in Manalis are adhered to the substrate. ***It would be impossible to immerse molecules into the fluid layer of Manalis***. As noted, "immerse" means "to plunge into something that surrounds or covers." (www.m-w.com). **The fluid molecules of Manalis could not surround or cover the immersed molecules of Applicant and at the same time remain adhered to the substrate**. Thus, Manalis cannot possibly teach molecules between the energy-emitting tip and the storage medium where the molecules are at least partially immersed in a fluid medium because such molecules would render the fluid layer of Manalis inoperable.

To further delineate the clear distinction between the teachings of Manalis and Applicant, Applicant respectfully submits new Claims 23 through 31 which specifically state these aspects of distinction. In particular, new Claims 23 and 29 teach a directed energy beam which is clearly distinguishable from the broad application of voltage and electrical field of Manalis. Claim 26 teaches particles which do not adhere to the storage medium, which is clearly distinguishable from the adsorbed fluid layer of Manalis.

Claim 10: Claim 10 depends from Claim 9 and therefore benefits from the above arguments. As such, Applicant includes herein by reference each and every statement made above. After careful review of Examiner's statements in support of rejection, which are repeated verbatim from the previous Office Action, it appears that Examiner has not fully appreciated or reviewed Applicant's responses. Respectfully, and for Examiner's convenience, Applicant incorporates by reference each and every statement from Applicant's prior responses. Applicant respectfully requests that Examiner specifically consider the argument

that a directed emission of electrons from the tip, as in Applicant's invention, is inconsistent with oxidation of the substrate, as in Manalis.

Applicant submits that the broad electric field of Manalis does not teach the directed energy beam of Applicant. Also, Applicant respectfully disagrees that the AFM tip of Manalis emits electrons and requests that Examiner explain how emitting electrons from the AFM tip would cause the substrate to also emit or lose electrons, i.e. oxidize.

Applicant respectfully submits new Claims 23 through 31 to further clarify the distinction between the teachings of Manalis and Applicant. In particular, new Claims 23 and 29 teach a directed energy beam which is clearly distinguishable from the broad application of voltage and electrical field of Manalis.

Claim 12: Claim 12 also depends from Claim 9 and benefits from like arguments. As such, Applicant includes herein by reference each and every statement made above.

Manalis does not in any way teach that any provided fluid layer is comprised of one-dimensional molecules or that there are "molecules arranged in a line" as Examiner states. Also, Manalis does not in any way teach that any molecules in any provided fluid layer comprise conductive molecules. Manalis does not even mention the term "molecule", and thus certainly cannot and does not teach one-dimensional molecules, molecules arranged in a line or conductor molecules. Should Examiner persist in such views, Applicant respectfully requests Examiner to specifically state where such statements are to be found within Manalis.

For at least the reasons argued above, Applicant contends that Manalis does not anticipate Claim 12.

Claim 14: Claim 14 also depends from Claim 9 and benefits from like arguments. As such, Applicant includes herein by reference each and every statement made above. Manalis does not in any way teach conductive molecules attached to the storage medium, or any molecules.

Examiner states that "the fluid layer is conductive so that indents can be formed and read electrically." The only fluid that Manalis suggests is water. (Column 3, line 11). Water itself is non-conductive unless it contains dissolved ions to transport electric charge. However, as explained at length above, Examiner has recognized that Manalis does not teach any molecules other than the molecules which comprise the fluid. Manalis does not teach that dissolved ions or other conductive molecules are present among the water molecules. Thus,

there are no molecules that can conduct an electric charge. Moreover, Manalis teaches that local oxidation causes a small hump on the surface, (column 3, lines 15-16), not an indent as Examiner states. At the very most, Manalis teaches that there are water molecules attached to the storage medium, (column 3, line 11 ("layer of water adsorbed on the surface")), but does not teach conductive molecules. Manalis therefore fails to anticipate the conductive molecules of Claim 14.

For the reasons argued above, among other reasons not specifically laid out herein, Applicant contends that Manalis fails to anticipate the above Claims. Withdrawal of the Examiner's rejection and allowance of each of Claims 9, 10, 12 and 14 is respectfully requested.

4. Claim Rejections – 35 U.S.C. § 103(a)

For the purpose of the following discussion, the Examiner is respectfully reminded of the basic considerations which apply to obviousness rejections.

> When applying 35 U.S.C. §103, the following tenets of patent law must be adhered to:
> (A) The Claimed invention must be considered as a whole;
> (B) The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination;
> (C) The references must be viewed without the benefit of impermissible hindsight vision afforded by the Claimed invention; and
> (D) Reasonable expectation of success is the standard with which obviousness is determined. MPEP §2141.01, *Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1134 n.5, 229 U.S.P.Q. 182, 187 n.5 (Fed. Cir. 1986).

In addition, it is respectfully noted that to substantiate a *prima facie* case of obviousness the initial burden rests with the Examiner who must fulfill three requirements. More specifically:

> To establish a *prima facie* case of obviousness, three basic criteria must be met.
> **First**, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings.
> **Second**, there must be a reasonable expectation of success.
> **Finally**, the prior art reference (or references when combined) must teach or suggest all the Claim limitations. The ***teaching or suggestion*** to make the Claimed combination **and** the ***reasonable expectation of success* must *both be found in the prior art,* and not *based on Applicant's disclosure***. (emphasis and formatting added) MPEP § 2143, *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)

5. The Examiner has rejected Claims 1, 2, 7, 8, 21 and 22 as being allegedly unpatentable over Manalis in view of U.S. Patent No. 4,497,007 ("Greiner"). Applicant respectfully disagrees and traverses the rejection. Applicant includes herein by reference each and every statement made above, in addition these Claims are also patentable for the following additional reasons.

Paralleling the MPEP references cited above, the Federal Circuit has enunciated several guidelines in making a §103 obviousness determination. A *prima facie* case of obviousness is established when and only ***when the teachings from the prior art itself*** would appear to have ***suggested*** the Claimed subject matter to a person of ordinary skill in the art. *In re Bell*, 991 F.2d 781, 783, 26 U.S.P.Q.2d 1529, 1531 (Fed Cir. 1993) (quoting *In re Rinehart*, 531 F.2d 1048, 1051 (C.C.P.A. 1976)). (Emphasis added). "The mere fact that the prior art ***may*** be modified in the manner suggested by the Examiner does ***not*** make the modification obvious unless the prior art suggested the desirability of the modification." (emphasis added) *In re Fritch*, 23 U.S.P.Q.2d 1780, 1783-84 (Fed. Cir. 1992).

Claim 1: There is no suggestion or motivation to modify Manalis or Greiner or to combine their teachings. Greiner teaches a magneto-optical storage for recording information on magnetizable material and reading such information by optical scanning.

The purpose of the magnetic particles or ferrofluid in Greiner is the geometrical production of diffraction grid structures which may be optically scanned. Thus, the magnetic particles or ferrofluid in Greiner become fixated as a structural element of the storage medium.

Applicant's present invention utilizes ferrofluid to guide or channel energy from the energy-emitting tip to the storage medium. The ferrofluid does not evaporate as in Greiner, or otherwise deposit magnetic particles on the storage medium. The ferrofluid of Applicant's present invention serves its purpose in a transitory manner – only when energy is emitted from the energy-emitting tip – and is not permanently fixated on the storage medium as in Greiner.

In other words, Greiner teaches the production of geometric features for later optical recognition. These features are established by providing the ferrofluid particles in the presence of the magnetic field – the particles coalescing to the magnetic field – and then removing the fluid providing suspension to the particles.

As taught by Applicant, any wire-like conductor established by the metallic particles in the fluid is temporary – intended to facilitate the transfer of energy from the tip to the storage medium. Such a temporary nature is diametrically opposed to the teaching and purpose of

Greiner. Any modification to Greiner to provide such a temporary alignment property back to the particles would defeat the ability to establish the optical recognizable structures.

Also, the grid structures in Greiner are optically scanned to produce images which serve for interpretation of the information. The requirement in Greiner that the surface of the storage medium be optically scanned implies, if not dictates, that the surface is exposed. In other words, to be optically scanned the surface must be visible to the device performing the optical scanning. In Applicant's invention, the surface is not exposed because multiple probes (energy-emitting tips) can be attached to an emitter array above, and therefore covering, the surface. (See Specification, p. 11, lines 2-6). Greiner would be rendered inoperable if one skilled in the art attempted to use it in the manner Applicant teaches. Manalis in view of Greiner thus fails to meet the first criterion for establishing a *prima facie* case of obviousness.

Furthermore, and as has been noted by the Examiner, Manalis does not teach a ferrofluid. Although Greiner recites a ferrofluid, Applicant disagrees with the Examiner's idea that, "it would have been obvious to one of ordinary skill in the art to use a ferrofluid layer such Greiner's as Manalis's thin fluid layer, because the ferrofluid layer is a magnetic layer which improves the scanning sensitivity of Manalis'ss tip movement in a z-axis by immersing the scanned surface with a magnetic path."

This is an "***obvious to try***" rejection. Such a rejection is improper and has long been criticized and rejected as it is not a sufficiently discriminatory test. *See In re Lindell,* 155 USPQ 521, 523 (C.C.P.A. 1967.) Greiner specifically uses ferrofluid for geometrical production of a diffraction grid structure . Applicant submits that it would not have been obvious to use such a fluid as a conductor.

"***If the*** proposed ***modification or combination*** of the prior art ***would change the principle of operation*** of the prior art invention being modified, then ***the teachings*** of the reference ***are not sufficient*** to render the Claims prima facie obvious." *In re Ratti* 270 F.2d 810, 123 USPQ 349 (CCPA 1959) (comment added). Any modification to Greiner so as to permit the ferrofluid particles to remain in suspension and **NOT** affix to the storage medium would fundamentally undermine the purpose and teaching of Greiner. Examiner's reliance upon Greiner is therefore both unfounded and in error.

As argued above, Applicant submits that Manalis also fails to teach an energy-emitting tip. Furthermore, and contrary to the Examiner's assertion, Manalis does not teach "particles contained in the fluid medium.

A particle for particle substitution is not correct - ferromagnetic particles produce a result that is different kind form the prior art, in a way that was not taught or suggested by the

prior art. There is no mention of "particles" within Manalis. The mention of "ferrofluid" and "magnetic particles" in Greiner is for a purpose entirely removed from the purpose in Applicant's present invention.

The differences in form, function and purpose of a liquid can not be ignored. Applying Examiner's statements to other fluids, Examiner appears to contend that a soda-pop and liquid concrete can and should be construed as substantially identical and functionally interchangeable as both may contain water and particulate substances. The fluid of Greiner serves the purpose of producing geometric structures, i.e. its particles form a solid. The fluid of Manalis is not akin to the fluid medium set forth by Applicant, and no teaching or suggestion is expressed or implied in Manalis or Greiner that it is or should be.

For at least these reasons, the Examiner's rejection of Claim 1 should now be withdrawn.

Claim 2: Claim 2 depends from Claim 1 and thus benefits from like arguments. Applicant includes herein by reference each and every statement made above. Furthermore, Applicant disagrees with the Examiner's writing that in Manalis: "the energy-emitting tip emits electrons (Fig. 1; AFM where its tip emits electrons to oxidize the medium's surface)." As discussed above, Manalis does not teach an energy emitting tip, reciting instead a tip to which "negative bias is applied" where data is to be written by application of a voltage (col. 3, lines 8-15). Manalis also fails to recite electron emission, and understandably so, as emission of electrons would thwart Manalis'ss aim of "writ[ing] bits onto a metal substrate by ***oxidizing*** the surface"(Abstract). Oxidation results from a loss of electrons, not a gain. Emitting electrons from Manalis'ss tip would thus more likely ***reduce*** the medium's surface.

Greiner also fails to teach an energy emitting tip emitting electrons. Applicant thus submits that Claim 2 is patentable over Manalis in view of Greiner.

Claim 7: Claim 7 depends from Claim 1 and benefits from the arguments presented above. Applicant includes herein by reference each and every statement made above. The cited references therefore do not render Claim 7 *prima facie* obvious.

Claim 8: Claim 8 also depends from Claim 1 and benefits from like arguments. As such, Applicant includes herein by reference each and every statement made above. The Examiner states that Manalis teaches that particles form a bridge between the tip and the storage medium as in Applicant's invention because "fluid is an interface between the tip and the medium". Applicant respectfully disagrees, for at least the following reasons:

First, as described at length above, Manalis does not teach any particles or molecules other than the molecules of "a thin layer of fluid adsorbed" on the surface of the storage material. (Applicant maintains that Manalis does not teach any molecules at all). It is clear that Applicant teaches that the particles or molecules forming the bridge are particles or molecules other than those that comprise the fluid medium. Applicant's Claims clearly refer to "particles contained in the fluid medium," and that the "particles form a bridge." Applicant does not teach that the fluid medium or the molecules of the fluid itself form the bridge. Manalis only teaches molecules, if any, of the fluid itself, not particles contained within the fluid. Thus, Manalis cannot and does not teach that particles contained in the fluid medium form a bridge between the tip and the storage medium.

Second, Manalis simply does not recite either a bridge or a fluid interface. The only "interface" Manalis teaches is "Interface Module 155", which operates to send "commands to controller 105, causing tip 115 to be brought adjacent a desired point on substrate S"(col. 4, lines 26-28). As Manalis FIG. 1 illustrates, the interface in Manalis is far removed from the area between the tip and the storage medium. Moreover, the interface in Manalis is part of a data-handling circuit, and functions to control the location of the tip over the storage area. It is not a chemical or physical bridge.

Applicant respectfully points out, per MPEP § 2141, "[t]he references must be viewed without the benefit of impermissible hindsight vision afforded by the Claimed invention." Applicant believes that the "obviousness" to modify Manalis in view of Greiner is a mere *ipse dixit* of the Examiner, in hindsight, having the benefit of Applicant's teachings. Applicant respectfully submits that the Examiner has not made a prima facie case of obviousness for the elements of this Claim. For at least these reasons, Applicant contends that Claims 1, 2, 7 and 8 are patentable and Examiner's rejection of these Claims should be withdrawn.

6. The Examiner has rejected Claim 21 for limitations similar to those in the above rejection. Applicant respectfully disagrees and traverses the rejection. Applicant includes herein by reference each and every statement made above.

7. The Examiner has rejected method Claim 22 for the same reason of obviousness as used in the rejection for the corresponding apparatus Claimed in Claim 1. Applicant respectfully disagrees and traverses the rejection. Applicant includes herein by reference each and every statement made above.

8. The Examiner has rejected Claim 3 as being allegedly unpatentable over Manalis in view of U.S. Patent No. 4,497,007 ("Greiner") and U.S. Patent No. 6,084,849 ("Durig"). Applicant respectfully disagrees and traverses the rejection. Applicant includes

herein by reference each and every statement made above. In addition these Claims are also patentable for the following additional reasons.

As noted by the Examiner, neither Manalis nor Greiner recite a data storage device wherein the energy-emitting tip emits thermal energy (as recited in Claim 3). Durig teaches a storage medium where an emitting tip emits heat energy; however, Applicant disagrees with the Examiner's assertion that the combination of Manalis, Greiner and Durig renders Claim 3 obvious.

Claim 3 depends from Claim 1, and therefore benefit from like arguments. Furthermore, the combination of Manalis, Greiner and Durig lacks motivation. Manalis teaches using an atomic force microscope to write bits onto a metal substrate where there is an "adsorbed fluid layer", "adsorbed liquid film," or "layer of water adsorbed on the surface" of the substrate, although Manalis recites no purpose for the adsorbed fluid, does not Claim the adsorbed fluid, and does not depict the adsorbed fluid in any of its drawings.

Greiner teaches using a suspension of "soft magnetic particles similar to those of ferrofluid" poured on to a hard magnetic storage material where a "reflection grid is obtained ***after evaporation of the liquid***." In other words, the fluid is removed such that only solid material remains. Manalis employs oxidizable metal as the storage medium, and makes no mention of a magnetizable storage medium as used in Greiner. A person practicing Manalis would not observe the mere mention of an "adsorbed fluid layer" without any mention of its purpose and then look to use the fluid suspension of magnetic particles in Greiner. Indeed, the only "adsorbed fluid layer" Manalis mentions is water. This would not motivate one to use the suspension of magnetic particles from Greiner, which is suitable for use with a magnetizable substrate, as the "adsorbed fluid layer" of Manalis, which uses an oxidizable substrate.

Examiner's suggestion to combine these references invites confusion. Although Manalis states no purpose for its "thin layer of fluid," it is clear that its purpose is not to evaporate and render a solid. It is also clear that the Manalis fluid does not have and is not intended to have any magnetic properties. It is entirely unclear how Examiner believes Durig can be combined with Manalis and Greiner. Durig teaches the mechanical formation of an indent on a storage medium and the use of heat to remove the indent. Greiner teaches the magnetic and chemical deposit of particles to form a bump on the storage medium.

The combination of Manalis, Greiner and Durig also lacks reasonable expectation of success. "The mere fact that the prior art ***may*** be modified in the manner suggested by the Examiner does ***not*** make the modification obvious unless the prior art suggested the desirability of the modification." (emphasis added) *In re Fritch*, 23 USPQ 2d 1780, 1783-84 (Fed. Cir. 1992). The Examiner presumably cites Manalis, Greiner and Durig in an effort to

render a data storage system with a ferrofluid and a tip that emits thermal energy. However, Applicant contends that such a combination would not work.

Durig uses a heated probe tip to remove an indent. There is no indication in Durig that the tip is sufficient to create a bump, much less a bump on Manalis'ss substrate, or a bump formed by Greiner's ferrofluid Greiner, which the Examiner cites for its use of ferrofluid, only uses heat to liquefy a solid layer in which soft magnetic particles are embedded. The soft magnetic particles are then distributed according to information recorded in a hard magnetic layer. In other words, it is the magnetic field that forms bumps, not heat. The heat in Greiner does not create a bump, but merely liquefies a solid.

In addition, Durig teaches the application of a specific highly localized heat (e.g. to create a bit). Greiner, on the other hand, utilizes generalized heat. The generalized heat liquefies the layer so that the magnetic particles may coalesce in the presence of a magnetic field to form optically recognizable grid structures. Thus, where Durig teaches use of localized heat in a manner more like a soldering iron, Greiner teaches use of generalized heat in a manner more like an oven.

Finally, Manalis does not teach using heat at all, and in fact indicates that heat is incompatible with high-density data storage, writing "While devices operating on the atomic or molecular scale surpass this threshold [of a terabit per square inch], they are generally not suited for commercial data storage due to ***stringent low-temperature requirements***..." (col. 1, lines 45-48). There is, therefore, no reasonable expectation of success in combining Durig, Manalis and Greiner.

Given the arguments presented above, Applicant contends that Claim 3 is patentable over the cited references. Withdrawal of the rejection and allowance of Claim 3 is therefore requested.

9. Claims 5 and 6 stand rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Manalis in view of Greiner and U.S. Patent No. 5,925,818, issued to Cleveland et al. (hereinafter, "Cleveland"). Respectfully, Applicant disagrees and traverses the rejections. Claims 5 and 6 depend from Claim 1, and benefit from like arguments. Additional, independent reasons for the patentability of Claims 5 and 6 are detailed herein below.

Claim 5: Claim 5 recites a fluid medium comprising a high dielectric fluid. As noted by the Examiner, Manalis and Greiner do not teach a high dielectric fluid/material. Cleveland teaches a method and apparatus for magnetic force control of a scanning probe. Cleveland observes that "[t]hin films commonly absorb to surfaces in both liquid and air, and

can produce forces when in contact with the tip," and that the "[m]agnetic force control of the present invention using force feedback can be used to offset these detrimental forces during imaging." (Column 13, lines 35-36, 41-43). Thus, Cleveland in no way teaches or advocates the use of a high-dielectric fluid medium. Indeed, the purpose Cleveland's teachings is to provide a magnetic force to counter forces created by fluids.

Cleveland states that its method and apparatus of magnetic force control offers several advantages over other known methods, including advantages over use of electrostatic forces and an enhanced ability to work in fluids. (Column 13, line 66 through column 14, line 5). Examiner cites the following observation from Cleveland:

> Also, as mentioned previously, the ability to work in fluids is enhanced when using an atomic force microscope in that images on many types of samples are improved. Since fluids have dielectric constants, the change in capacitance as well as hydrodynamic forces between the plates may cause problems using capacitive techniques in fluid. Further, electric fields are affected by the presence of most insulating or conducting material. This may create difficulties in that the source of the field (the capacitor plate not attached to the cantilever) may be close to the cantilever, and typically an intervening medium, such as a fluid, between the field source and the cantilever will affect the field.

(Column 14, lines 3-14). It is clear from this cite from Cleveland and the context of the cite that Cleveland teaches that its method and apparatus of magnetic force control offers advantages over using capacitive techniques in fluid and that fluids will affect electric fields (but not magnetic fields). Cleveland in no way teaches or advocates the use of high-dielectric fluids, but merely observes that an advantage of its invention is that it is easier to use with fluids, which have dielectric constants that cause problems for other methods. If Cleveland teaches anything with respect to high-dielectric fluids, it is that they should be avoided.

As per MPEP § 2141, "[t]he references must be viewed without the benefit of impermissible hindsight vision There is nothing present in any of the three references to suggest this impermissible combination, or that doing so would achieve the invention disclosed by Applicant. Respectfully, Applicant asserts that there is no suggestion in the improperly combined references of Manalis, Greiner and Cleveland to suggest or imply Applicant's Claimed invention.

For at least these reasons, the Examiner's rejection of Claim 5 should now be withdrawn.

Claim 6: Claim 6 recites particles comprising a material chosen from the group consisting of electrically conducting, dielectric and paraelectric materials.

Neither Manalis, Greiner nor Cleveland teach paraelectric materials or materials in the paraelectric phase.

Applicant includes herein by reference each and every statement made above. Applicant believes that Claims 5 and 6 are patentable over the cited references, at least for the reasons detailed herein above. Reconsideration and allowance of Claims 5 and 6 is respectfully requested.

10. Claim 11 is rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Manalis in view of Durig. Applicant respectfully disagrees and traverses the rejection. Claim 11 benefits from the same arguments made in traversing the Examiner's rejection to Claim 3, and therefore Applicant includes herein by reference each and every statement made above.

11. Claim 13 is rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Manalis in view of U.S. Patent No. 6,391,217, issued to Schaffer et al. (hereinafter, "Schaffer"). Applicant respectfully disagrees and traverses the rejection, first because Claim 13 depends from Claims 9 through Claim 12 and as such Applicant includes herein by reference each and every statement made above. In addition Claim 13 is patentable for the following additional reasons.

The Examiner asserts that "Schaeffer teaches an AFM having a liquefied dielectric layer 110 made of a dielectric polymer (Fig. 4b; col. 4, lines 37-48). Applicant respectfully reasserts that this is inaccurate, and requests that Examiner specifically consider and respond to the following.

Schaeffer teaches a method for forming a patterned film on a substrate by applying a electric field to the interface between two flowable media on a substrate to produce a structure in the first flowable media, then hardening the structure to form a patterned film. Schaeffer only uses an AFM to provide an ***image*** of a replication of his silicon master electrode (Fig. 8; col. 10, lines 51-60).

Applicant disagrees with the Examiner's assertion that "it would have been obvious to one of ordinary skill in the art to use Schaeffer's dielectric polymer as Manalis'ss fluid layer, because the dielectric polymer can be liquefied under an applied electric field". This argument would result in a solid polymer, i.e., Schaeffer's "glassy or semi-crystalline polymer (e.g., polystyrene)" (col. 4, lines 37-40) being placed upon Manalis'ss substrate S. Manalis specifies a thin layer of ***fluid*** adsorbed upon substrate S (col. 2, lines 40-43), not a ***solid*** placed

thereupon. Schaeffer's polymer may liquefy under an applied electric field, but in Manalis, a voltage is applied either to a ***fluid*** layer or, if operating in "tapping mode"(col. 2, line 60-col. 3, line 6), directly to substrate S ***without need for the intermediate fluid layer***. In neither case is the voltage applied to an ***intermediate solid*** with the aim of creating a fluid. It would not, therefore, have been obvious to add an additional dielectric polymer (as in Schaeffer) to Manalis'ss system, and there is no suggestion or motivation to combine teachings of the two references.

Claim 13 also recites one-dimensional conductor molecules chosen from the group including surfactants. Manalis and Schaffer are all silent as to the use of surfactants. The references therefore fail to teach or suggest all elements of Claim 13, in addition to failing to provide motivation. Applicant therefore requests withdrawal of the rejection and allowance of Claim 13.

12. Claims 15, 16, 17 and 19 are rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Manalis in view of Greiner. Applicant respectfully disagrees and traverses the rejection. Claims 15, 16, 17 and 19 benefit from the same arguments made in traversing the Examiner's rejections to Claims 1, 2, 7 and 8, and therefore Applicant includes herein by reference each and every statement made above.

In addition, Applicant has added new Claims 29, 30 and 31 which further delineate the clear distinction between the teachings of Manalis and Greiner with those of Applicant. These Claims distinctly point out the unique methods Applicant teaches.

CONCLUSION

For the reasons given above, and after careful review of all the cited references, Applicant respectfully submits that none of the cited references, nor any combination of the cited references, will result in, teach or suggest Applicant's Claimed invention. But even if any such combination might arguably result in such Claimed invention, it is submitted that such combination would be non-obvious and patentable.

In view of the above Amendments and Remarks, Applicant has addressed all issues raised in the Office Action dated 7 July 2004, and respectfully solicits a Notice of Allowance for Claims 1-3, 5-17, 19, 21 and 22. Should any issues remain, the Examiner is encouraged to telephone the undersigned attorney.

It is believed that all of the pending Claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or

concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending Claims (or other Claims) that have not been expressed. Finally nothing in this paper should be construed as an intent to concede any issue with regard to any Claim, except as specifically stated in this paper, and the amendment of any Claim does not necessarily signify concession of unpatentability of the Claim prior to its amendment.

Applicant believes that no fees are currently due; however, should any fee be deemed necessary in connection with this Amendment and Response, the Commissioner is authorized to charge deposit account 08-2025, referencing the Attorney docket number 10003492-1.

Respectfully submitted,

By: 

Daniel W. Roberts, Reg. No. 52172
LATHROP & GAGE L.C.
4845 Pearl East Circle, Suite 300
Boulder, CO 80301
Telephone: (720) 931-3016
Facsimile: (720) 931-3001